

CLAIMS

What is claimed is:

1. A gateway for exchanging IP frames with remote IP devices over a communication link to a frame switched network, the gateway comprising:
 - a wide area network interface coupled to the communication link for exchanging the IP frames with the remote IP devices;
 - a local area network interface for receiving outbound IP frames from each of a plurality of IP clients, each outbound IP frame comprising a local IP header and payload:
 - the IP header comprising:
 - an IP client socket comprising a client IP address and a client port number of the IP client; and
 - a destination socket comprising a remote device IP address and a port number of a remote IP device; and
 - a router module coupled between the local area network interface and the wide area network interface, the router module receiving each outbound IP frame from the local area network interface and providing a corresponding translated outbound IP frame to the wide area network interface;
 - the translated outbound IP frame comprising a translated IP client socket comprising a gateway IP address and a global port number of the gateway that uniquely associates with the IP client socket and:
 - the payload if the outbound IP frame is a data frame; and
 - translated payload if the outbound IP frame is a media session signaling frame.
2. The gateway of claim 1, wherein:
 - a media session signaling frame comprises at least one of:
 - a media session socket comprising the client IP address and a media port number of the IP client; and
 - a signaling contact socket comprising the client IP address and a signaling

6 port number and

7 the translated payload comprises:

8 a translated media session socket if the media session signaling frame
9 includes a media session socket, the translated media session socket comprising the
10 gateway IP address and a translated media port number that uniquely associated with
11 the media session socket; and

12 a translated signaling contact socket if the media session signaling frame
13 includes a signaling contact socket, the translated signaling contact socket comprising
14 the gateway IP address and a translated signaling port number that uniquely associated
15 with the signaling contact socket.

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1 3. The gateway of claim 2, wherein the router module further comprises a
2 translation table for recording:

3 the global port number in unique association with the IP client socket;
4 the translated media port number in unique association with the media session
5 socket; and
6 the translated signaling port number in unique association with the signaling
7 contact socket.

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1 4. The gateway of claim 1, wherein:

2 the router module comprises a frame handling module for comparing the
3 payload of the outbound IP frame to a plurality of signaling frame pattern and
4 determining that the outbound IP frame is a media session signaling frame if the
5 payload matches a signaling frame pattern.

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1 5. The gateway of claim 1, further comprising:

2 a payload translation database for storing each signaling frame pattern in
3 association with translation instructions; and

4 a payload translation module for translating each socket of the payload that is
5 identified for translation in the translation instructions.

6. A gateway for exchanging IP frames with remote IP devices over a communication link to a frame switched network, the gateway comprising:

- a wide area network interface coupled to the communication link for exchanging the IP frames with the remote IP devices;
- a local area network interface for receiving outbound IP frames from each of a plurality of IP clients, each outbound IP frame comprising a local IP header and payload:
 - the IP header comprising:
 - an IP client socket comprising a client IP address and a client port number of the IP client; and
 - a destination socket comprising a remote device IP address and a port number of a remote IP device; and
 - the payload comprising:
 - a media session socket comprising the client IP address and a media port number of the IP client;
- a router module coupled between the local area network interface and the wide area network interface, the router module receiving each outbound IP frame from the local area network interface and providing a corresponding translated outbound IP frame to the wide area network interface, the translated outbound IP frame comprising both a global IP header and translated payload:
 - the global IP global header comprising a translated IP client socket comprising a gateway IP address and a global port number of the gateway that uniquely associates with the IP client socket;
 - the translated payload comprising a translated media session socket comprising the gateway IP address and a translated media port number that uniquely associates with the media session socket; and
- the router module comprising a translation table for recording both:
 - the IP client socket in association with the global port number; and
 - the media session socket in association with the global media port

number.

7. A gateway for exchanging IP frames with remote IP devices over a communication link to a frame switched network, the gateway comprising:

- a wide area network interface coupled to the communication link for exchanging the IP frames with the remote IP devices;
- a local area network interface for receiving outbound IP frames from each of a plurality of IP clients, each outbound IP frame comprising an IP header and payload, the local IP header comprising:
 - an IP client socket comprising a client IP address and a client port number of the IP client; and
 - a destination socket comprising a remote device IP address and a port number of a remote IP device;
- a router module coupled between the local area network interface and the wide area network interface, the router module receiving each outbound IP frame from the local area network interface and providing a corresponding translated outbound IP frame to the wide area network interface, the router module comprising:
 - an IP layer translation module for:
 - generating the translated outbound IP frame in response to receiving an outbound IP frame, the translated outbound IP frame comprising a global IP header and payload, the global IP global header comprising:
 - a translated IP client socket comprising a gateway IP address and a global port number of the gateway that uniquely associates with the IP client socket; and
 - the destination socket; and
 - recording the IP client socket in association with the global port number in a translation table;
 - an application layer translation module for:
 - generating translated payload in response to detecting that the outbound IP frame comprises at least one of a media session socket and a signaling

contact socket, the translated payload comprising:

a translated media session socket if the media session signaling frame includes a media session socket, the translated media session socket comprising the gateway IP address and a translated media port number that uniquely associated with the media session socket; and

a translated signaling contact socket if the media session signaling frame includes a signaling contact socket, the translated signaling contact socket comprising the gateway IP address and a translated signaling port number that uniquely associated with the signaling contact socket.

8. The gateway of claim 7, wherein the routing module further comprises a frame handling module for passing the outbound IP frame with the payload to the IP layer translation module in response to determining that the outbound IP frame is a data frame.

9. The gateway of claim 8, wherein the frame handling module compares the payload of the outbound IP frame to a plurality of signaling frame pattern to determine that the outbound IP frame is a media session signaling frame if the payload matches a signaling frame pattern.

10. The gateway of claim 7, wherein the routing module further comprises a translation table and the application layer translation module further provides for recording, in the translation table each of:

the global port number in unique association with the IP client socket;
the translated media port number in unique association with the media session socket; and
the translated signaling port number in unique association with the signaling contact socket.

11. A method of operating a gateway that supports multiple IP clients to effect the

exchange of IP frames between a plurality of IP clients and remote IP devices over a communication link to a frame switched network, the method comprising:

receiving an outbound IP frame from each of a plurality of IP clients, each outbound IP frame comprising a local IP header and payload:

the local IP header comprising:

an IP client socket comprising a client IP address and a client port number of the IP client; and

a destination socket comprising a remote device IP address and a port number of a remote IP device; and

providing a corresponding translated outbound IP frame to the wide area network interface, the translated outbound IP frame comprising a translated IP client socket comprising a gateway IP address and a global port number of the gateway that uniquely associates with the IP client socket and:

the payload if the outbound IP frame is a data frame; and

translated payload if the outbound IP frame is a media session signaling frame.

12. The method of claim 11, wherein:

a media session signaling frame comprises at least one of:

a media session socket comprising the client IP address and a media port number of the IP client; and

a signaling contact socket comprising the client IP address and a signaling port number and

the translated payload comprises:

a translated media session socket if the media session signaling frame includes a media session socket, the translated media session socket comprising the gateway IP address and a translated media port number that uniquely associated with the media session socket; and

a translated signaling contact socket if the media session signaling frame includes a signaling contact socket, the translated signaling contact socket comprising

14 the gateway IP address and a translated signaling port number that uniquely associated
15 with the signaling contact socket.

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1 13. The method of claim 12, further comprising recording, in a translation table:
2 the global port number in unique association with the IP client socket;
3 the translated media port number in unique association with the media session
4 socket; and
5 the translated signaling port number in unique association with the signaling
6 contact socket.

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1 14. The method of claim 11, further comprising:
2 comparing the payload of the outbound IP frame to a plurality of signaling frame
3 patterns; and
4 determining that the outbound IP frame is a media session signaling frame if the
5 payload matches a signaling frame pattern.

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1 15. The method of claim 11, further comprising:
2 translating each socket of the payload by identifying translation instructions
3 associated with each signaling frame pattern in a payload translation database.

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1 16. A method of operating a gateway that supports multiple IP clients to effect the
2 exchange of IP frames between a plurality of IP clients and remote IP devices over a
3 communication link to a frame switched network, the method comprising:

4 receiving each outbound IP frames from each of a plurality of IP clients, each
5 outbound IP frame comprising a local IP header and payload:

6 the IP header comprising:

7 an IP client socket comprising a client IP address and a client port
8 number of the IP client; and

9 a destination socket comprising a remote device IP address and a
10 port number of a remote IP device; and

the payload comprising:
a media session socket comprising the client IP address and a media port number of the IP client;
providing a corresponding translated outbound IP frame to the wide area network interface, the translated outbound IP frame comprising both a global IP header (152) and translated payload:
the global IP global header comprising a translated IP client socket comprising a gateway IP address and a global port number of the gateway that uniquely associates with the IP client socket;
the translated payload comprising a translated media session socket comprising the gateway IP address and a translated media port number that uniquely associates with the media session socket; and
recording, in a translation table, both:
the IP client socket in association with the global port number; and
the media session socket in association with the global media port number.

17. A method of operating a gateway that supports multiple IP clients to effect the exchange of IP frames between a plurality of IP clients and remote IP devices over a communication link to a frame switched network, the method comprising:
receiving each outbound IP frames from each of a plurality of IP clients, each outbound IP frame comprising an IP header and payload, the local IP header comprising:
an IP client socket comprising a client IP address and a client port number of the IP client; and
a destination socket comprising a remote device IP address and a port number of a remote IP device;
providing a corresponding translated outbound IP frame to the wide area network interface by a process of:
generating the translated outbound IP frame in response to receiving an

14 outbound IP frame, the translated outbound IP frame comprising a global IP header and
15 payload, the global IP global header comprising:

16 a translated IP client socket comprising a gateway IP address and
17 a global port number of the gateway that uniquely associates with the IP client socket;
18 and the destination socket; and

19 generating translated payload in response to detecting that the outbound
20 IP frame comprises at least one of a media session socket and a signaling contact
21 socket, the translated payload comprising:

22 a translated media session socket if the media session signaling frame
23 includes a media session socket, the translated media session socket comprising the
24 gateway IP address (156) and a translated media port number (164) that uniquely
25 associated with the media session socket (127); and

26 a translated signaling contact socket (155) if the media session signaling
27 frame includes a signaling contact socket (124), the translated signaling contact socket
28 (155) comprising the gateway IP address (156) and a translated signaling port number
29 (166) that uniquely associated with the signaling contact socket (154).

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1 18. The method of claim 17, further comprising generating the translated IP frame
2 with the payload in response to determining that the outbound IP frame is a data frame.

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1 19. The method of claim 18, wherein the step of determining whether the outbound
2 IP frame is a media session signaling frame comprises comparing the payload of the
3 outbound IP frame to a plurality of signaling frame pattern and determining that the
4 outbound IP frame is a media session signaling frame if the payload matches a
5 signaling frame pattern.

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1 20. The method of claim 17, further comprising recording, in a translation table each
2 of:

3 the global port number in unique association with the IP client socket;

4 the translated media port number in unique association with the media session

5 socket; and
6 the translated signaling port number in unique association with the signaling
7 contact socket.
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